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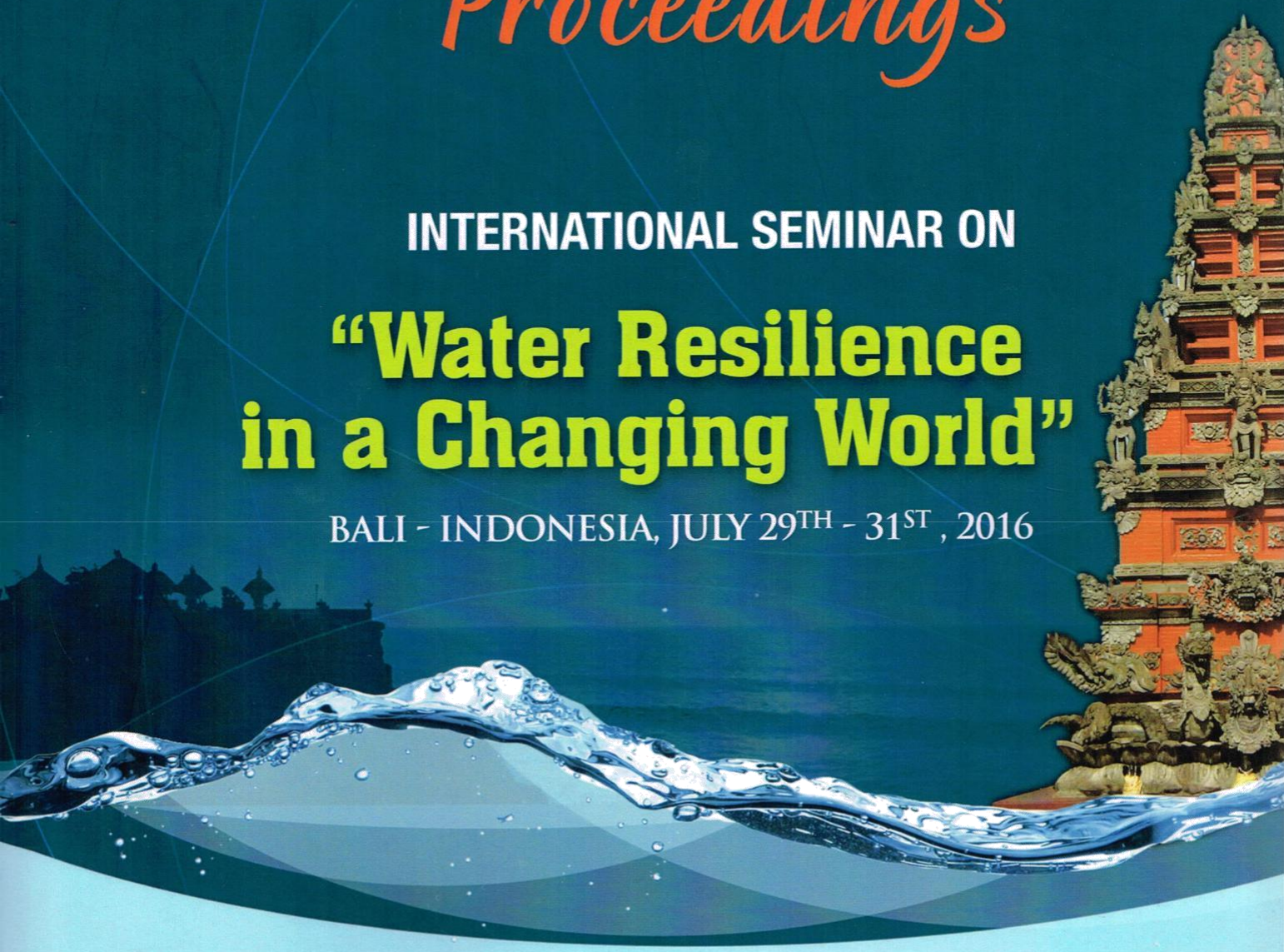

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ARRANGEMENT IN FLOOD CONTROL AND WATER QUALITY IN URBAN DRAINAGE SYSTEM: CASE STUDY KALI WONOREJO SURABAYA

Minarni N. T.[1*], Novirina H.[1], Iwan W.[1], and Pancawati D.[1]

[1]University of PembangunanNasional"Veteran"Jawa Timur

*e-mail: trilita69@yahoo.com

Abstract

Urban drainage have an important role in urban settlements. serves as a means of urban drainage drain excess water to the sea surface. It also serves as a means of drainage in urban household sewage or industrial. So if there is a flood, it can lead to contamination and the source of illness for people in the surrounding region. Therefore in this paper conducted a study on the arrangement of the flood control and water quality in the case studies Wonorejo river in Surabaya. The purpose of this study to plan flood control system is environmentally sound. As for the first step of research conducted to analyze the drainage system in the existing conditions, determine the appropriate design of the WWTP.

Keywords: flood, urban drainage, water quality.

INTRODUCTION

Flood control is a physical and nonphysical effort to flood walls with flood discharges until a certain level is decent (not for the largest flood discharge). Flood control is intended to minimize the negative impact of floods, among other things, loss of life, property damage, environmental damage, and disruption of social and economic activities.

Flood is one of disruption to transport and economic activity of citizens of the city of Surabaya. Flooding also can disrupt the smooth flow of transportion in Surabaya due to submerged roads in Surabaya by the water so hard to pass. Flooding in Surabaya is caused by the inability of a drainage system in receiving the discharge that occurs in its catchment area.

Wonorejo river crossing dense residential area and empties into the sea area of the East Coast of Surabaya. Residential areas densely along the Wonorejo river, potentially eliminating the naturalness of the river because the activity of the society, both domestic, small industries household scale, as well as commercial activity more, produce domestic waste discharge not through the process of sewage treatment, directly discharged into the sewer, which finally ditch Wonorejo river

boils down to time, which causes the quality of the river is getting worse. In the event of flooding during the rainy season, the river water is polluted domestic waste will rise to overflow into the land, that flooded houses along the river. Possible impacts associated with skin diseases and stomach, the result of outburst floods due to water contaminated. Hence the need to take waste management, but the centralized processing system (Centrelized Sewage Treatment System) requires substantial investment. Therefore, the process of communal wastewater treatment is important and realistic option for treating domestic wastewater in the river banks, so that the discharge does not interfere with the carrying capacity of the river.

In this study will be to evaluate the flood control system already exists, then develop flood control system that is environmentally sound, pay attention to the quality of the water contained in the body of the channel so that when a large flow occurs which brings water to sea water quality is not polluting the sea because previously been treated beforehand. This study will propose WWTP design that is appropriate for the region, and will obtain flood control system that can improve the environmental carrying capacity. The specific objective of this study was to determine the pattern of flood control at Wonorejo river, determine the appropriate waste management system to reduce the pollutant load in Wonorejo river, to determine the flood control system is environmentally insight. The long term goal of this research is to get a pattern structuring system of flood control and water pollution are applicable and environmentally insight.

LITERATURE STUDY

Flood Control System

Rainwater that falls in an area needs to be drained or removed to prevent inundation or flooding. The way is by making up streaming channel that can collect rain water flowing on the surface of the soil to the next canal system flowed into a larger system and eventually end up in disposal or which is usually called the body of water. The system is called the drainage system. Flood control system is closely connected with the drainage system area.

Flood control principles are:

a. Hold water as big as possible in the upstream by creating reservoirs and conservation of soil and water
b. Absorb rainwater as possible into the soil by infiltration wells or rorak and provide green open areas.
c. Controlling the water in the middle of the store while in the area of retention.
d. Drain the water as soon as possible to the mouth or into the sea by keeping the water container capacity.
e. Securing the population, vital infrastructure and property.

In doing flood control, is necessary to develop strategies in order to achieve the expected results. As for the flood control strategies are as follows:

a. Control the spatial
   Control the spatial is done with planning the use of space within its capabilities by considering permasalahn flooding, according to the land use designation, and law enforcement against violations of spatial plan that has considered the master plan for development of the river area.
b. Setting flood design
c. Setting flood prone area
d. Increasing the role of the community
e. Arrangements to reduce the impact of flooding on communities.
f. Catchment management
g. Provision of funds

IPAL Communal

The process commonly used in Indonesia for wastewater treatment from the family household septic tank is a combination of anaerobic processes and infiltratiom. Process septic tank is a simple process as well as cheap and suitable for less dense areas, when used in dense urban areas, will lead to pollution of underground water. Septic Tank usually only treat wastewater from the toilets alone. Other wastewater such as wastewater laundry, kitchen and bathroom directly discharged without

being processed, resulting in environmental pollution in the area. While Centralized sewage Treatment System requires substantial investment. Therefore, the process of communal wastewater treatment is important and realistic option for treating domestic wastewater in the river banks, so that the discharge does not interfere with the carrying capacity of the river.

Anaerobic Baffle Reactor (ABR)

Anaerobic Baffle Reactor (ABR) is a processing system suspended anaerobic bioreactor sectional. Suspended growth are more profitable than attached growth because it does not require a supporting medium and not easily clogged.

ABR developed by McCarty and colleagues at Stanford University (McCarty, 1981 in Wang, 2004). ABR is a UASB (Upflow Anaerobic Shidge Blanket) that plug in series, but does not require the details of its operations, thus requiring start-up period is shorter. A series of vertical bulkhead mounted in ABR making liquid waste flows under and over from the inlet to the outlet, resulting in contact between the active liquid waste biomass. Organic compound concentration profile varies throughout ABR resulting population growth of different microorganisms in each compartment, depending on the specific environmental conditions generated by decomposition compounds. Bacteria in the bioreactor floats and settles appropriate flow characteristics and gas produced, but moves horizontally to the ends of the reactor slowly thus increasing cell retentation time. Liquid waste biomass into contact with active during the flow in the reactor, so that the effluent free of biological solids. This configuration is able to demonstrate a high level of COD removal. (Malakahmad *et al.*, 2011, Wang *et al*., 2004, Shanmugam and Akunna, 2010, Liu *et al*., 2007, Jamshidi and Khalesidoost, 2014).

ABR main advantages are:

1. Being able to separate the process of methanogenesis asidogenesis and longitudinally which allows the reactor has a two-phase system, the absence of control problems and high costs.
2. The design is simple, does not require a mechanical stirrer, construction costs are relatively cheap, biomass does not require specific characteristics of precipitation, sludge produced is low.
3. The pattern of hydrodynamic ABR can reduce wastage of bacteria.

Methodology of Study

The stages of the research is to simulate and analyze the existing drainage system as flood control, analyze the quality of incoming waste industrial home in body channels and determine the WWTP design that is suitable for the area, to simulate the flood control system is environmentally insight.

RESULTS AND DISCUSSION

The simulation results on the condition of the drainage system is now the Wonorejo river drainage system has not been able to accommodate the flow of flooding due to reduced channel capacity, and changes in land use in the area around Wonorejo river. From the laboratory analysis, to improve the flow of Wonorejo river, using waste treatment plant using the ABR (Anaerobic Baffle Reactor) for domestic wastewater treatment.

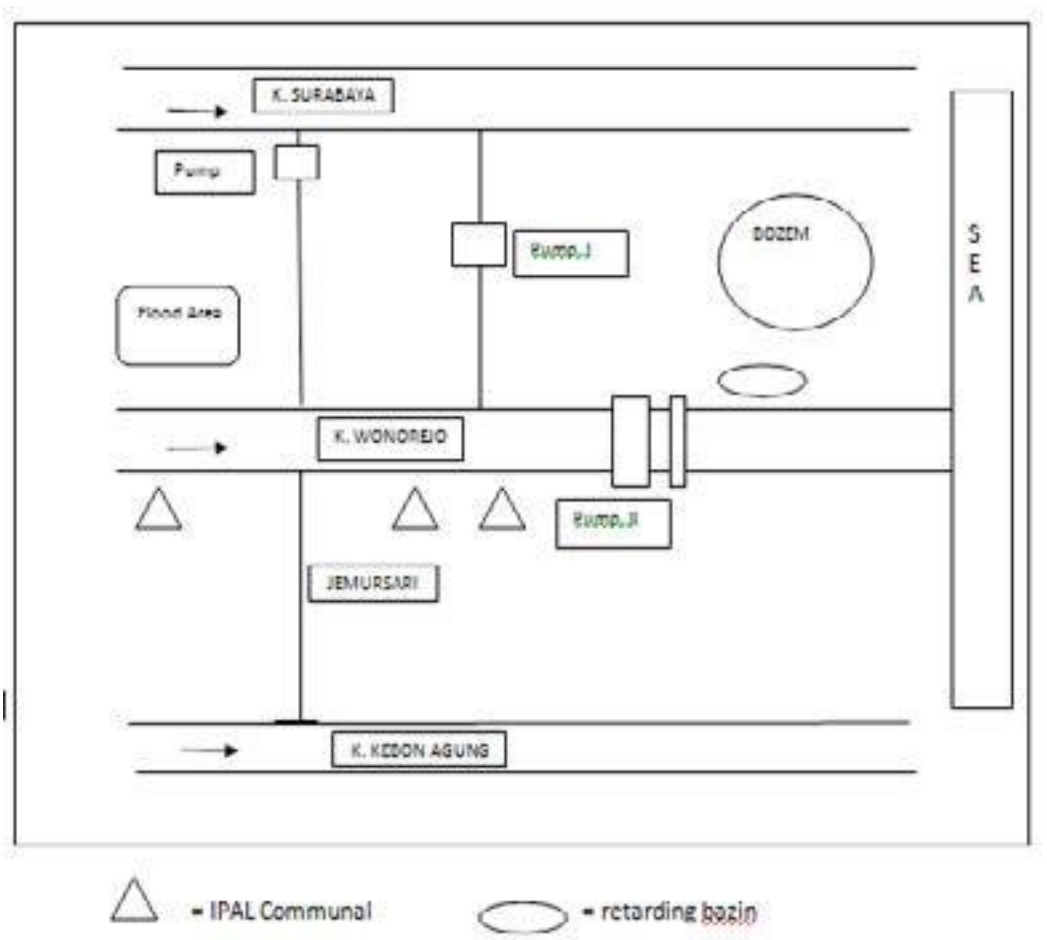

Figure 1. Flood control system and IPAL Communal system Planning

CONCLUSION AND RECOMMENDATION

The simulation results drainage system has not been able to accommodate the flow in the event of a large rain. It is caused by changes in the drainage coefficient due to changes in land use. From the results of laboratory tests, communal waste treatment Anaerobic Baffled Reactor can be used to reduce the burden of waste that enters water bodies.

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